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April 6, 1970

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FLS

Dr. Joshua Lederberg
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Dear Dr. Lederberg:

There has been some delay in the receipt of your xeroxed copies mailed at Palo Alto on March 24th. I retired from the Pan American Sanitary Bureau eleven years ago. I can best be reached at my home address, as given above.

In regard to "Yellow Fever Still Survives in Jungles of Africa, Brazil," I have the following comments.

Paragraph 2: Walter Reed did not himself participate as a subject in the yellow fever experiments in Havana in 1900-1901.

Paragraph 4: Yellow fever is a harmless disease of monkeys in Africa and of the Cebus monkeys in the Americas. The infection is much more widespread in Africa than you have suggested, occurring from Senegal to Ethiopia south of the Sahara. In the Americas, jungle yellow fever has occurred since 1947 on the island of Trinidad and in all of the countries on the mainland of the Americas excepting Canada, the United States, El Salvador, Uruguay, and Chile. The aegypti mosquito does not flourish under modern conditions in the northern ports of our Atlantic Coast. In previous times when so many sailing ships came up from the Caribbean, the aegypti mosquito was often brought at the beginning of summer into American ports which had numerous water barrels on the docks for fire control. These permitted the mosquito to establish itself and spread about while waiting for a later ship to bring in active cases to start a summer and fall outbreak.

Paragraph 6: The decision to attempt the eradication of Aedes aegypti was only secondarily related to the Rio outbreak of 1928-1929. The finding of a silent rural aegypti-transmitted yellow fever in 1930-1931 and the discovery of jungle yellow fever in 1932 were largely responsible for the exploitation of the possibility of aegypti eradication, which was first observed in some of the cities of Northeast Brazil in 1932-1933. The original eradication efforts were in Brazil and Bolivia. Experience in Brazil showed that the complete elimination of the aegypti mosquito was in the long run much more economical than even a halfhearted attempt to maintain a service for the protection of the larger cities from yellow fever. In 1941 Bolivia declared the eradication of aegypti in its territory and in 1942 presented a resolution at the Eleventh Pan American Sanitary Conference urging the other countries of the Americas to organize eradication programs. Both urban and jungle yellow fever had been found in Bolivia in 1932-1933. Also, it should be noted that beginning in 1934 jungle yellow fever moved from the Amazon Valley to the watershed of the Paraguay-Paraná Rivers, and during the next seven years swept through the forested areas of all of the states of Southern Brazil, of Paraguay, and of Northeastern Argentina.

During World War II there was no serious extension of the eradication effort to other countries, but great progress was made in the eradication of aegypti in a number of Brazilian states. In 1944 jungle yellow fever started another sweep from the Amazon Valley into the southern states and into northern Argentina in many of the areas which had suffered on the previous excursions ten years earlier.

In 1947 Brazil presented a resolution at the annual meeting of the Pan American Health Organization in Buenos Aires. This resolution committed the Pan American Sanitary Bureau to the coordination of efforts for the permanent solution of the problem of yellow fever through the eradication of the aegypti mosquito, such coordination to consist of aid in the solution of such legal, technical, and financial problems as might arise. There were no dissenting voices to this proposal, and the corresponding document was signed by Dr. Thomas Parran, the official delegate of the United States at the meeting.

By the early 1960s practically all of the nations and territories of the Western Hemisphere, with the exception of the United States, had organized serious efforts for the eradication of the yellow fever and dengue mosquito, Aedes aegypti. Eradication was successfully completed and certified after rather extensive and independent checking of the situation by the Pan American Health Organization for the following countries: Argentina, Uruguay, Paraguay, Brazil, Bolivia, Chile, Peru, Ecuador, Guyana, and French Guiana in South America, and Panama, Costa Rica, El Salvador, Honduras, Nicaragua, Guatemala, British Honduras, and Mexico in Middle America.

In addition to these certified countries, Colombia was cleared, except for a small area adjacent to Venezuela, and the island of Trinidad, both of which areas have suffered repeated reinfestations.

Since 1958 when the first series of eradication certifications were made, the governing bodies of the Pan American Health Organization have consistently year after year voted resolutions urging the remaining countries to complete the eradication of aegypti, not only for their own protection but also to protect the quite considerable investment already made in the eradication effort. The United States participated in all of these meetings, never once taking exception to the proposed measures. The records show year after year unanimous acceptance of the proposed resolutions.

In 1961 a severe attack was made by Mexico on the failure of the United States to eradicate Aedes aegypti during the discussion at the annual meeting of the Pan American Health Organization. In 1962 the Mexican Government put the eradication of Aedes aegypti on the agenda for the meeting of the President of Mexico with President Kennedy.

In 1957 the wave of jungle yellow fever, which had been moving up through Panama and Central America since 1948, crossed the border between Guatemala and Mexico. Mexico then had eradicated the Aedes aegypti mosquito in its territory but realized that its land frontier and small boat interchange with the United States would make it very difficult to maintain freedom of aegypti unless the United States lived up to the obligation established

through the united action of all of the nations of the Americas since 1947. The Mexican initiatives in 1961-1962 led to a policy discussion at a very high level in the United States Government. As a result, the Surgeon General was authorized to commit the United States to the eradication of Aedes aegypti in the southern states, in Puerto Rico, and in the Virgin Islands at the meeting of the Pan American Sanitary Conference in Minneapolis in August 1962.

Some years ago El Salvador was found to be reinfested after some seven or eight years of freedom from Aedes aegypti. The investigation made by the representative of the Pan American Health Organization suggested very strongly that the reinfestation had probably come through the importation of used automobile tires from the United States. The Government of El Salvador made a request to the United States for assistance in undertaking anew the eradication of aegypti. Nothing came of this initiative and the infestation is reported to have spread to Honduras and Guatemala. In the meantime, in 1967, the northern part of Brazil was reinfested, most probably by small coastal boats running contraband from the Caribbean to the mouth of the Amazon.

In 1963 the Congress of the United States made $3,000,000 available for the initial organization of the aegypti eradication program; this money became available in October of that year. In the following years budgets were increased with the result that by 1969 some $56,000,000 had been appropriated for this effort. Detailed statistical reports of the work done have never been published. The reports to the Pan American Health Organization have consisted of simple reports by years and counties as to the presence of aegypti and as to whether or not work was being carried out in individual counties.

The United States Government did request a survey of the situation by the Pan American Health Organization a couple of years ago. An evaluation was made by a three-man group of experienced Latin American mosquito workers, but the report of this group has never been published.

In anticipation of eventually facing up to the eradication of Aedes aegypti, the Surgeon General of the Public Health Service authorized in 1957 a pilot eradication project in Pensacola. This pilot project covered, I believe, a four-year period. And apparently the technique later used in the United States program was that developed in Pensacola. By abandoning its eradication effort, the United States has placed in jeopardy the first regional eradication effort in which the nations of the Americas undertook a permanent solution of a continental problem. The fact that the United States has not had yellow fever for many years is quite beside the point. In practically every problem, the solution of which would require the joint effort of many nations, there are almost certainly some to whom the problem at issue is of less concern than to others. An eradication effort must be worked on at least a regional basis. The threat of the United States to the other countries of the continent is one of reinfestation.

We can glory today in the fact that during the past twenty-five years there has been only one port infected with yellow fever virus; this occurred at Port-of-Spain, Trinidad, in 1954. The resultant quarantine reputedly cut the income of this island by $23,000,000 to $28,000,000.

So long as the cities adjacent to jungle yellow fever areas are free of aegypti the threat of yellow fever to the United States is admittedly very low. Should the reinfestation of Brazil had been permitted to spread throughout that enormous country, it would be most difficult to recreate the conditions which permitted the initiation of the eradication of aegypti there in the 1930s. (As a matter of statistical interest, the Brazilian campaign from 1931 up to the certification of eradication in 1958 gives the number of house visits made to achieve eradication at 617,000,000. Today with a greatly increased population and the exaggerated movement of population to cities and towns, the effort would have to be considerably greater.)

After the above diversion, I would turn for a moment to your sixth paragraph. Your comment that yellow fever is still reported to the extent of a dozen cases a year is quite misleading. Jungle yellow fever strikes the individual who goes into forests; it oftentimes strikes the settler at the periphery of the settlement. As you know, yellow fever is a disease which strikes hard in the beginning and in many cases leaves little opportunity of getting to town for medical care. Jungle yellow fever is a peripheral disease that occurs all too often in a forgotten segment of the population. Furthermore, yellow fever is one disease which is seldom reported in the Americas in the absence of microscopic examination of liver tissue or from the isolation of virus in animals. To have a due appreciation of what is happening to the exposed population, it is necessary to examine the cumulative distribution of yellow fever over a five or ten-year period with map pins of various colors for individual years.

Escaping to your ninth paragraph, I would point out that the aim of total eradication is not too ambitious. The cost and difficulty of maintaining an effective aegypti control program over a period of years is so great that one cannot today recommend it for the degree of risk the United States is running. Once eradication has been accomplished, the prevention of reinfestation depends on peripheral expansion of the eradicated area.

I have mentioned above how all of South America excepting the northern fringe of the continent was cleared of Aedes aegypti. I for one would not recommend a partial program in the United States at the present time, except possibly an island-wide program for Puerto Rico or a program along the Mexico-United States border, for two purposes: first, to protect Mexico from reinfestations, of which they have registered nine, the last being in October 1969, and, second, to demonstrate the possibility of aegypti eradication in the United States. The conditions on one side of the Rio Grande are not too different from those on the other side but that eradication can be undertaken with assurance on this side of the border.

The occurrence of large-scale dengue epidemics in the Caribbean and in Venezuela in 1963 and 1964 has been followed by a second outbreak in 1969. It has been shown that there are more than one strain of dengue virus in the Americas, which has led those familiar with the hemorrhagic fever of Asia to anticipate the possibility of a similar reaction here at some time in the future.

Dr. Joshua Lederberg April 6, 1970

You mention in the next paragraph the outbreak of yellow fever in Senegal in 1965. It has apparently been outdistanced by a flareup of yellow fever in 1969 in Nigeria, Niger, Dahomey, Upper Volta, and probably other countries just south of the Sahara.

I have far exceeded the comments I expected to make on the basis of this article. I shall then not attempt to comment on the second article referring to CBW facilities. I realize fully that it is difficult for one in your position to know all the details of the wide variety of subjects which you cover. I, of course, feel that my comments could have been more useful if made before the article went to press.

Sincerely yours,

Fred L. Soper